Amendments to the Specification

Please insert the following new paragraph on page 1 before line 5.

This application is a division of Application No. 10/022,339 filed December 20, 2001.

The paragraph starting at page 1, line 6 has been amended as follows.

The present invention relates to an apparatus and a method for ink jet recording, which perform recording ~~in~~ on a recording medium by discharging ink. More specifically, the invention relates to an ink jet recording apparatus and a method for performing ink jet recording, which can perform recording on the full surface of the recording medium without any blank spaces.

The paragraph starting at page 8, line 14 has been amended as follows.

Fig. 13 is a schematic perspective view showing the recording unit of the ink jet ~~recoding~~ recording apparatus of the first embodiment of the invention.

The paragraph starting at page 11, line 4 has been amended as follows.

Fig. 32 is a schematic perspective view showing the conventional example of recording with no blank spaces (~~recoding~~ recording without any margins).

The paragraph starting at page 12, line 6 has been amended as follows.

A plurality of recording sheets 13 are stacked, and loaded on the paper feeding tray of the ASF 40. The recording sheets 13 on the paper feeding tray are separated and conveyed, starting from its uppermost sheet, by the rotation of a paper feed roller (not shown), and fed through a sheet conveying path (not shown) into the sheet conveying unit.

The paragraph starting at page 14, line 5 has been amended as follows.

Basically, the recording sheet 13 is conveyed ~~be~~ by being held between the LF roller 33 and the pinch roller 35, and between the discharge roller 37 and the gear, and then a recording operation is performed. However, to enlarge an area of a recording portion with respect to an area of the recording sheet 13, the recording operation can be performed only by holding the recording sheet between the LF roller 33 and the pinch roller 35 when ~~recoding~~ recording is executed on the leading end of the recording sheet 13, and between the discharge roller 37 and the gear when recording is executed on the rear end of the recording sheet 13.

The paragraph starting at page 17, line 9 has been amended as follows.

Here, to clarify a positional relation, Fig. 4 shows a schematic side view of the recording apparatus when seen from the arrow direction A of Fig. 3. In the drawing, a reference numeral 16 denotes an ink discharge nozzle row provided in the recording head 10. The discharge nozzle row 16 includes a plurality of nozzles arrayed roughly linearly, and ~~a~~ roughly a half of the upstream side thereof in a sheet conveying direction X is called a discharge nozzle row 16b (second nozzle row). Similarly, as shown in Fig. 5, roughly a half of the downstream side thereof in the sheet conveying direction X is called a discharge nozzle row 16a (first nozzle row).

The paragraph starting at page 19, line 16 has been amended as follows.

Subsequently, processing for masking the second region (region indicated by a reference numeral ~~15~~ 19 in Fig. 8) of the leading end recording data is carried out (step S3 in Fig. 2). This processing is for executing recording on the leading end by dividing it into a plurality of paths. Fig. 6 is a schematic plan view showing the method of masking the ~~leasing~~ leading end recording data. In the drawing, a reference numeral 17 denotes the entire range of the leading end recording data; and 18 the first region of the leading end recording data.

The paragraph starting at page 20, line 18 has been amended as follows.

Figs. 7A and 7B are schematic perspective views, each showing a relation between the platen 11 and the platen ink absorber 12. For the foregoing reason, the ribs are provided in the platen and, according to the invention, a plurality of rib rows are provided. As shown in Figs. 3 to 7A, the platen 11 includes a platen rib row ~~B11b~~ B 11b composed of ribs, which are arrayed roughly at equal intervals up to about half of the upstream side of the recording sheet conveying direction X, and a platen rib row ~~A11a~~ A 11a composed of ribs, which are arrayed up to about half of the downstream side of the recording sheet conveying direction X such that each rib is disposed roughly in the center between the ribs of the platen rib row ~~B11b~~ B 11b. In addition, when seen from the recording sheet conveying direction X, as shown in Fig. 4, the platen rib row ~~B11b~~ B 11b is disposed up to about half of the upstream side of the discharge nozzle row 16, and the platen rib row ~~A11a~~ A 11a is disposed up to about half of the downstream side of the discharge nozzle row 16.

The paragraph starting at page 21, line 13 has been amended as follows.

In the platen 11 having such rib arrays, the platen ink absorber 12 is disposed in such a way as to fill portions other than the ribs. The platen ink absorber 12 is made of a material such as ~~pipe~~ pulp or high polymer, having good ink absorbing efficiency, and has ~~hole~~ holes bored in portions corresponding to the ribs of the platen 11.

The paragraph starting at page 21, line 20 has been amended as follows.

By combining the platen 11 with the platen ink absorber 12, a unit shown in Fig. ~~7A~~ 7B is formed, which is disposed in the recording apparatus.

The paragraph starting at page 21, line 23 has been amended as follows.

On the platen 11 having the ribs disposed roughly in a staggered form as described above, the first region 18 of the leading end recording data is set in correspondence with the pitch of the platen rib row ~~B11b~~ B 11b of the upstream side. More specifically, the first region 18 of the leading end recording data is set in such a way as to be disposed roughly in the center between the ribs of the platen rib row ~~B11b~~ B 11b (Fig. 6). Accordingly, the pitch of the first region 18 of the leading end recording data substantially coincides with that of the platen rib row ~~B11b~~ B 11b, and its width is about half of the pitch of the platen rib row ~~B11b~~ B 11b.

The paragraph starting at page 22, line 13 has been amended as follows.

Subsequently, the first region 18 is scanned by the first scanning of the carriage 30 (step S4 of Fig. 2). Specifically, as described above, the carriage 30 is driven, and scanned, and the recording operation is performed based on the masked recording data. Ink droplets discharged from the discharge nozzle of the recording head 10 land on the recording sheet 13 to be fixed. However, as shown in Fig. 4, since the discharge nozzle row 16b includes the discharge nozzle not facing the recording sheet 13 by the distance Lb,

ink droplets discharged therefrom directly reach the platen ink absorber 12 to be absorbed and recovered. In addition, as shown in Fig. 16, for the recording of the first region 18, ink droplets are discharged from a portion having no platen rib row ~~B11b~~ B 11b. Accordingly, no ink droplets are discharged onto the platen rib ~~B11b~~ B 11b. Moreover, since the region that corresponds to the first region 18 of the leading end recording data is only that of the discharge nozzle row 16b, no ink droplets are discharged onto the platen rib row ~~A11a~~ A 11a, and ink droplets discharged outside the recording sheet 13 are all absorbed and recovered by the platen ink absorber 12.

The paragraph starting at page 23, line 11 has been amended as follows.

A reason for the discharging of no ink droplets on the ribs of the platen 11 by the foregoing method is as follows. That is, since the recording sheet 13 is conveyed while being guided by the ribs, the side opposite the recording surface side of ~~the backside of~~ the recording sheet ~~13,~~ 13 (the backside) and the ribs of the platen 11 ~~are slid~~ relatively slide and, if there are ink droplets stuck on the ribs of the platen 11, the ~~opposite recording surface~~ backside side of the recording sheet 13 may be stained by ink.

The paragraph starting at page 23, line 25 has been amended as follows.

Subsequently, the recording sheet 13 is conveyed by a predetermined amount (step S5 of Fig. 2). By referring to Fig. 5, which shows a state after the conveyance

of the recording sheet 13, it can be understood that the leading end portion of the recording sheet 13 after step S5 is located within the range of the discharge nozzle row 16a, and conveyed from the most downstream side of the discharge nozzle row 16a to the leading end of the recording sheet 13, away by a distance La. A reason for such a distance La is completely similar to that for the distance Lb described above with reference to Fig. 4. In addition, a conveying amount is preferably ~~be~~ set equal to half or lower of a length of the discharge nozzle row 16 in the recording sheet conveying direction X. Thus, the length of the discharge nozzle length can be used highly efficiently.

The paragraph starting at page 25, line 11 has been amended as follows.

Subsequently, the second region 19 is scanned by the second scanning of the carriage 30 (step S7 of Fig. 2). This scanning may be carried out by the first scanning during returning in step S4, or by returning to the start of the first scanning, and then scanning in the same direction as that for the first scanning. In this case, a portion of the valid recording data where ink droplets are discharged to the outside of the recording sheet 13 is between the ribs of the platen rib row ~~A11a~~ A 11a because of a relation between the setting of the first region 18 of the leading end recording data and the platen rib rows ~~A11a~~ A 11a and ~~B11b~~ B 11b. Accordingly, no ink droplets are discharged onto the platen rib row ~~A11a~~ A 11a. As a result, ink droplets discharged outside the recording sheet 13 are all absorbed and recovered by the platen ink absorber 12.

The paragraph starting at page 29, line 2 has been amended as follows.

Then, determination is made as to the conveyance of the recording sheet 13 by a predetermined amount from the recording sheet rear end position previously detected and stored in the memory (step S12 of Fig. 10). Specifically, determination is made as to whether the rear end portion of the recording sheet 13 is in the range of the discharge nozzle row 16b or not. If the sheet rear end is determined to be in this range, then the process proceeds to the next step.

The paragraph starting at page 29, line 12 has been amended as follows.

Subsequently, the second region of the rear end recording data (region indicated by a reference numeral 29 in Fig. 14) is masked (step S13 of Fig. 10). Specific means is almost similar to that of the recording with no blank spaces in the sheet leading end, and thus only brief description will be made. That is, the recording data to be masked in this step is one located in the place of the same phase as that for the platen rib row ~~B11b~~ B 11b (Fig. 12).

The paragraph starting at page 29, line 27 has been amended as follows.

Then, a first region 28 is recorded by the first scanning of the carriage 30 (step S14 of Fig. 10). The recording operation is similar to that for the recording with no

blank spaces in the sheet ~~leasing~~ leading end (see Fig. 12). Thus, the sticking of ink droplets onto the platen rib row ~~B11b~~ B 11b is prevented, and ink droplets discharged to the outside of the recording sheet 13 are directly absorbed and recovered by the platen ink absorber 12. Fig. 11 shows a state after the end of this recording operation of one line. As indicated by a hatched line, an integrated recording region 13c is formed by integrating the region recorded before the sheet rear end recording with the first recording region by the first scanning on the recording sheet 13.

The paragraph starting at page 31, line 7 has been amended as follows.

Then, a second region 29 is recorded by the second scanning of the carriage 30 (step S17 of Fig. 10). The recording operation is similar to that for recording with no blank spaces (recording with no margins) in the sheet leading end (see Fig. 14). Thus, the sticking of ink droplets onto the platen rib row ~~A11a~~ A 11a is prevented, and ink droplets discharged to the outside of the recording sheet 13 are directly absorbed and recovered by the platen ink absorber 12. Fig. 13 shows a state after the end of the recording operation of one line, where the integrated recording region 13c already recorded by step S14 is integrated with a last recording region 13d recorded in step S17, thereby completing the recording on the full surface of the recording sheet 13.

The paragraph starting at page 32, line 16 has been amended as follows.

In such a case, each rib of the platen rib row ~~A11a~~ A 11a may be disposed between the adjacent ribs of the platen rib row ~~B11b~~ B 11b or roughly in the center, the first and second regions 18 and 19 of the leading end recording data may respectively be set between the ribs of the platen rib rows ~~B11b~~ B 11b and ~~A11a~~ A 11a or roughly in the centers, and a width of each in this case may be set about half of the rib interval.

The paragraph starting at page 34, line 13 has been amended as follows.

In the foregoing first embodiment, the case of only one discharge nozzle row of the recording head was shown. However, the invention is not limited to such a case, and it can be applied to a case where the ~~recoding~~ recording head includes a plurality of discharge nozzle rows.

The paragraph starting at page 36, line 10 has been amended as follows.

With the foregoing constitution, when the leading end or the rear end portion of the recording sheet is recorded, sheet conveyance control is performed such that the end portions ~~stops~~ stop at least once each in the regions LA and LB. Thus, it is possible to perform recording with no blank spaces on the full surfaces of the recording sheet.

The paragraph starting at page 36, line 18 has been amended as follows.

Next, description will be made of a case where a plurality of nozzle rows are arrayed in a longitudinal direction (straight ~~ling~~ line along the sheet conveying direction).

The paragraph starting at page 36, line 22 has been amended as follows.

Fig. 15B shows an example where the plurality of nozzle rows are arrayed in the longitudinal direction. In this case, sheet conveyance control and the rib row arrangement of the platen become a little complex. That is, in the case of the sheet conveyance control, the control described above with reference to the first embodiment is carried out for each discharge nozzle row, and the control is repeated according to the number of discharge nozzle rows. Specifically, a discharge nozzle row ~~B43~~ B 43 is divided into regions LBA and LBB; a discharge nozzle row ~~C46~~ C 46 into regions LCA and LCB; a discharge nozzle row ~~M45~~ M 45 into regions LMA and LMB; and a discharge nozzle row ~~Y44~~ Y 44 into regions LYA and LYB.

The paragraph starting at page 37, line 22 has been amended as follows.

In the embodiment, the region of the discharge nozzle row ~~B43~~ B 43 is not divided at the center. The region division can be made somewhere in the discharge nozzle row, and it is not always divided at the center. The same can be said of the division of the rib row of the platen. With the foregoing constitution, when the leading end or the rear end

portion of the recording sheet is recorded, it is advisable to perform sheet conveyance control such that the end portion stops at least once each in the divided regions LBB, LBA, LCB, LCA, LMB, LMA, LYB and LYA of the discharge nozzle row. Accordingly, it is possible to perform recording with no blank spaces on the full surface of the recording sheet.

The paragraph starting at page 38, line 10 has been amended as follows.

Next, description will be made of a case where a plurality of nozzle rows are partially arrayed in longitudinal and horizontal directions. Fig. 15C shows an example where the plurality of discharge nozzle rows are arrayed in the longitudinal and horizontal directions. In this case, the arrangement is basically similar to the longitudinal array of Fig. 15B. Specifically, the discharge nozzle row ~~C46~~ C 46 is divided into regions LAC and LCB; the discharge nozzle row M 45 into regions LMA and LMB; and the discharge nozzle row ~~Y44~~ Y 44 into regions LYA and LYB. The discharge nozzle row ~~B43~~ B 43 should preferably be divided at the same phase as that for the dividing position of any one of the discharge nozzle rows arrayed in the horizontal direction.

The paragraph starting at page 38, line 26 has been amended as follows.

In addition, regarding the rib rows of the ~~paten~~ platen, division may be made roughly at the center of each of the discharge nozzle rows ~~Y44~~ Y 44, ~~M45~~ M 45, and ~~C46~~

C 46. According to the embodiment, the number of ribs of the platen can be set to four by making common the divided regions of the adjacent discharge nozzle rows.

The paragraph starting at page 39, line 6 has been amended as follows.

With the foregoing constitution, when the leading end or the rear end portion of the recording sheet is recorded, it is advisable to perform sheet conveyance control such that the sheet end portions stop at least ~~one each in~~ once in each of the regions LCB, LCA, LMB, LMA, LYB and LYA. Accordingly, it is possible to perform recording with no blank spaces on the full surface of the recording sheet.

The paragraph starting at page 39, line 24 has been amended as follows.

In the foregoing first and second embodiments, reference was made to the example of the so-called serial type recording apparatus, which performs recording by conveying the recording medium, and scanning the recording head in the direction intersecting the recording medium conveying direction. However, the invention is not limited to such, and it can be applied to a so-called full line type recording apparatus, in which the recording head includes a discharge port row corresponding to the full width of the recording medium. For example, as shown in ~~Figs. 7A and 7B~~ Fig. 17 of the recording apparatus of the invention seen from the recording medium conveying direction, even if the recording head 10 of the serial type shown in Figs. 3, 9, 11, 13, etc., is changed to the

recording head of the full line type, it is possible to execute a recording method similar to that described above with reference to each of the embodiments.

The paragraph starting at page 40, line 17 has been amended as follows.

Further, the invention can also be applied to a recording apparatus, in which instead of the recording head of the full line type limited to a single color, a plurality of full line type recording heads independent for individual colors are provided in the recording medium conveying direction, and image recording of a plurality of colors, e.g., magenta, cyan, yellow, black, etc., can be performed.

The paragraph starting at page 42, line 5 has been amended as follows.

Then, in next step S22, to cue the leading end of the recording sheet 13 to a predetermined position, the LF motor is driven to rotate the LF roller forward. The predetermined position means a position satisfying a relation between the recording head 10 and the recording sheet 13 shown in Fig. 18. Here, to clarify a positional relation, Fig. 4 shows a schematic side view of the recording apparatus when seen from the ~~arrow direction A~~ side of Fig. 1. In the drawing, a reference numeral 16 denotes an ink discharge nozzle row provided in the recording head 10. The discharge nozzle row 16 includes a plurality of nozzles arrayed roughly linearly, and ~~a~~ roughly a half of the upstream side thereof in a sheet conveying direction is called a discharge nozzle row 16b. Similarly, as

shown in Fig. 5, roughly a half of the downstream side thereof in the sheet conveying direction is called a discharge nozzle row 16a.

The paragraph starting at page 44, line 7 has been amended as follows.

In the described case, data necessary for recording must be foreseen, including one regarding the distance Lb. In actual practice, therefore, it is necessary to prepare data of a region slightly larger than that to be recorded on the recording sheet. After the end of the cuing of the recording sheet carried out in the foregoing manner, a recording operation is started in the next step.

The paragraph starting at page 44, line 21 has been amended as follows.

Fig. 22 is a schematic plan view showing the method of masking the ~~leasing~~ leading end recording data. In the drawing, a reference numeral 117 denotes the entire range of the leading end recording data; and 118 the first region of the leading end recording data. The data first region 118 is composed of a first region signal portion 118a not superposed by a later-described second region of the ~~reading~~ leading end recording data, and a first region superposed portion 118b superposed by the second region of the leading end recording data.

The paragraph starting at page 47, line 11 has been amended as follows.

Here, the first region 118 of the leading end recording data ~~118~~ is set as data having a block form synchronized with the arrangement of the rib rows provided in the platen 11. To explain how a data block is formed in synchronization with the arrangement of the rib rows, the platen form will be described next.

The paragraph starting at page 47, line 18 has been amended as follows.

Figs. 7A and 7B are schematic perspective views, each showing a relation between the platen 11 and the platen ink absorber 12. For the foregoing reason, the ribs are provided in the platen and, according to the invention, a plurality of rib rows are provided. As shown in Fig. 7A, the platen 11 includes a platen rib row 11b composed of ribs, which are arrayed roughly at equal intervals up to about half of the upstream side of the recording sheet conveying direction, and a platen rib row 11a composed of ribs, which are arrayed up to about half of the downstream side of the recording sheet conveying direction such that each rib is disposed roughly in the center between the ribs of the platen rib row 11b. In addition, ~~when seen from the recording sheet conveying direction,~~ as shown in Fig. 5, the platen rib row 11b is disposed up to about half of the upstream side of the discharge nozzle row 16, and the platen rib row 11a is disposed up to about half of the downstream side of the discharge nozzle row 16. In the platen 11 having such rib arrays, the platen ink absorber 12 is disposed in such a way as to fill portions other than the ribs.

The paragraph starting at page 48, line 15 has been amended as follows.

The platen ink absorber 12 is made of a material such as ~~pipe~~ pulp or high polymer, having good ink absorbing efficiency, and has ~~hole~~ holes bored in portions corresponding to the ribs of the platen 11. By combining the platen 11 with the platen ink absorber 12, a unit shown in Fig. 7B is formed, which is disposed in the recording apparatus.

The paragraph starting at page 49, line 11 has been amended as follows.

Subsequently, in step S24, the first region is scanned by the first scanning of the carriage 30. Specifically, as described above, the carriage 30 is driven, and scanned, and the recording operation is performed based on the masked recording data. Ink droplets discharged from the discharge nozzle of the recording head 10 land on the recording sheet 13 to be fixed. However, as shown in Fig. 4, since the discharge nozzle row 16b includes the discharge nozzle not facing the recording sheet 13 by the distance Lb, ink droplets discharged therefrom directly reach the platen ink absorber 12 to be absorbed and recovered. In addition, for the recording of the first region, ink droplets are discharged only from a portion having no platen rib row 11b. Accordingly, no ink droplets are discharged onto the platen rib row 11b. Moreover, as shown in Fig. 22, since the region that corresponds to the first region of the leading end recording data is only that of the discharge nozzle row 16b, no ink droplets are discharged onto the platen rib row 11a, and ink droplets discharged outside the recording sheet 13 are all absorbed and recovered by the platen ink absorber 12.

The paragraph starting at page 50, line 12 has been amended as follows.

That is, since the recording sheet 13 is conveyed while being guided by the ribs, the opposite recording surface side of the backside of the recording sheet 13, and the ribs of the platen 11 ~~are slid~~ slide relatively and, if there are ink droplets stuck on the ribs of the platen 11, the opposite recording surface side of the recording sheet 13 may be stained by ink.

The paragraph starting at page 50, line 24 has been amended as follows.

Subsequently, in step S25, the recording sheet 13 is conveyed by a predetermined amount. Fig. 5 shows a state after the conveyance of the recording sheet 13. In this case, the leading end portion of the recording sheet 13 is located within the range of the discharge nozzle row 16a, and conveyed from the most downstream side of the discharge nozzle row 16a to the leading end of the recording sheet 13, away by a distance La. A reason for such a distance La is completely similar to that for the distance Lb described above with reference to Fig. 4. In addition, a conveying amount is preferably ~~be~~ set equal to half or ~~lower~~ less of a length of the discharge nozzle row 16 in the recording sheet conveying direction. Thus, the length of the discharge nozzle ~~length~~ row can be used highly efficiently.

The paragraph starting at page 53, line 22 has been amended as follows.

Fig. 19 shows a state after the end of the second scanning in the one-line recording operation. By forming a second recording region 113b on the recording sheet 13 by the second scanning, coupled with the first recording region 113a, one-line recording of the leading end recording data 117 is ~~competed~~ completed.

The paragraph starting at page 57, line 7 has been amended as follows.

Subsequently, in step S33, the second region of the rear end recording data is masked. Specific means is almost similar to that of the recording with no blank spaces in the sheet leading end, and thus only brief description will be made. That is, the recording data to be masked in this step is one located in the place of the same phase as that for the platen rib row 11b, and a region for random masking is provided in the boundary of the regions, where one-line recording is carried out in a divided manner. Now, the region for random masking will be described by referring to Fig. 20. In the drawing, a reference numeral 113d denotes an integrated portion of the first region single portion and an already recorded region; and 113e a first region superposed portion. For the first region superposed ~~region~~ portion 113e, random masking is carried out by using a random mask pattern similar to that for the superposed region of the leading end portion of the recording sheet. Also for the recording end portion, it is necessary to prepare recording data having a length longer than that of the recording sheet 13 by foreseeing ink droplets to be discharged to the outside of the recording sheet 13.

The paragraph starting at page 58, line 6 has been amended as follows.

Then, in step S34, a first region is recorded by the first scanning of the carriage 30. The recording operation is similar to that for the recording with no blank spaces in the sheet ~~leasing~~ leading end portion. Thus, the sticking of ink droplets onto the platen rib row 11b is prevented, and ink droplets discharged to the outside of the recording sheet 13 are directly absorbed and recovered by the platen ink absorber 12. Fig. 20 shows a state after the end of this recording operation of one line, where a region 113c integrating the region recorded before the sheet rear end recording with the first recording region by the first scanning, and a first region superposed portion 113e recorded with a 50% duty by random masking, are formed on the recording sheet 13.

The paragraph starting at page 59, line 5 has been amended as follows.

Then, in step ~~S16~~ S36, the first region of the rear end recording data is masked. This masking is carried out for recording a portion unrecorded in steps S33 and S34. In other words, the recording data to be masked in this step is data located in the place of the same phase as that for the platen rib row 11a. Now, description will be made of a region to be subjected to random masking by referring to Fig. 21. In the ~~drawings~~ drawing, a reference numeral 113f denotes a rear end second region superposed portion within the same range as that of the above-described rear end first region superposed portion; and 113g a rear end second region single portion. For the rear end second region

superposed portion 113f, random masking is carried out by using a random mask having a complementary relation with the random mask used for the rear end first region superposed portion 113e.

The paragraph starting at page 59, line 24 has been amended as follows.

Then, in step S37, a second region is recorded by the second scanning of the carriage 30. The recording operation is similar to that for recording with no blank spaces in the sheet leading end portion. Thus, the sticking of ink droplets onto the platen rib row 11a is prevented, and ink droplets discharged to the outside of the recording sheet 13 are directly absorbed and recovered by the platen ink absorber 12. Fig. 21 shows a state after the end of the recording operation of one line, where the region 113c already recorded ~~by~~ in step S34 is integrated with a region 113d recorded in step S37, thereby completing the recording on the full surface of the recording sheet 13.

The paragraph starting at page 63, line 21 has been amended as follows.

According to the described embodiment, to complete recording by four recording head scanning operations, the recording width LH of the recording head for one operation is divided into four portions to give random mask pattern rows different from one another. To achieve a 100% recording density in a complementary manner by four recording head scanning operations, four kinds of random mask patterns are provided for

each. In other words, since sixteen patterns are necessary, definition is provided by using a ~~4×4~~ 4×4 matrix in the embodiment.

The paragraph starting at page 64, line 6 has been amended as follows.

Fig. 29 shows random mask patterns. A1 to A4 of Fig. 29, B1 to B4 of Fig. 29, C1 to C4 of Fig. 29, and D1 to D4 of Fig. 29 respectively show patterns of portions, in which recording is completed by four recording head scanning operations. E1 and E2 of Fig. 29, and F1 and F2 of Fig. 29 show patterns of portions, in which recording is completed by two recording head scanning operations. For example, if A1 to A4 of Fig. 29 are superposed at the same place, and recording is carried out, then a pattern ~~a~~ of 100% duty is formed.

The paragraph starting at page 66, line 10 has been amended as follows.

As the type of the recording apparatus of the invention comprising the recording mechanism, which uses the liquid ~~injection~~ ejection recording head, other than one used as the image output terminal of the information processor of the computer or the like, a copying device combined with a reader or the like, a facsimile device having a transmitting/receiving function, or the like may be employed.

The paragraph starting at page 67, line 10 has been amended as follows.

As apparent from the foregoing, according to the present invention, it is possible to perform ~~recoding~~ recording on the full surface of the recording sheet with no blank spaces without any complication or enlargement of the recording apparatus, and without any cost increases. Moreover, it is possible to perform high image quality recording without generating any visible white or black lines in the boundary of the data block.